STAT:5400 Midterm 1, 2017

<Your Name>

<date when you took exam>

1   LaTeX

For p a non-zero real number and $x_1, \ldots, x_n$ positive real numbers, the *generalized mean* (also called the *power mean*) of the x_i, $i = 1 \ldots n$ is (Bullen, 2003)[3]:

$$M_p(x_1, \ldots, x_n) = \left(\frac{1}{n} \sum_{i=1}^{n} x_i^p \right)^{\frac{1}{p}} \tag{1}$$

The generalized mean with $p = 0$ is defined as the geometric mean:

$$M_0(x_1, \ldots, x_n) = \left(\prod_{i=1}^{n} x_i \right)^{\frac{1}{n}} \tag{2}$$

2   R

1. Write an R function to compute generalized means as defined in Section 1. Your function should accept a scalar value for p and a vector value for x, should check that those values are valid, and should either display an appropriate error message or return the power mean. Include the code that defines your function.

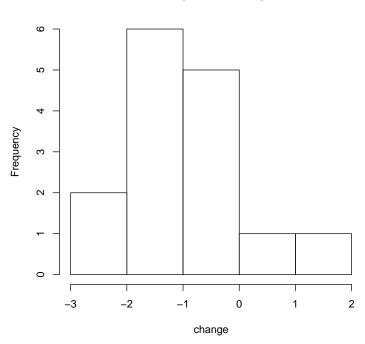2. Display the results of calling your function with the following arguments.

   (a) p = -5, x = c(31, 15,84)
   (b) p = 0, x = c(31, 15,84)
   (c) p = 5, x = c(-31, 15,84)
   (d) p = 5, x = c("Charlie", "Yuan", "Sue")

3. Read the dataset "albuterl.txt" from the Datasets section of the course web page into a data frame. Calculate the change `after - before` and display a histogram of it. Include your R code and the figure.

Histogram of change

References

Bullen, P. (2003). *Handbook of Means and Their Inequalities.* Kluwer, Dordrecht, Netherlands.